

Remarks/Arguments:

Applicant wishes to thank the Examiner for her detailed comments. As Examiner has grouped her actions by sections, Applicant will respond to these sections one by one.

Claim Rejections –35USC § 112:

Examiner has stated that claims 1-20 are rejected as being indefinite.

The attached amended claims correct the error in using the term “MORE”. It is believed that these amendments will correct the claims and Applicant urges that the rejection be withdrawn.

Claim Rejections –35USC § 103:

Examiner has stated that:

“Claims 1, 5-10 are rejected under 35 U.S.C. 103(a) as being obvious over *Halahan* (US 6,897,148) in view of *Siniaguine* (US 6498074).

“As for claim 1, *Halahan* discloses a method for fabricating heads of disk drive assemblies, comprising a Si wafer (Fig. 4, 110) which has been fabricated with a SiO₂ overcoat (120); depositing a layer of DRIE-resistant material (FIG. 15, 1010.1) on said SiO₂ overcoat (120); depositing a patterned layer of RIE-resistant material (1010.3) on said layer of DRIE-resistant material to form a primary mask.

“*Halahan* discloses etching by RIE (Fig. 15 and col. 8, 21-24, col.10, 5-6) through said primary mask (Fig. 15, 1010.3) to pattern said SiO₂ (Fig. 15, 120) overcoat layer and said layer of DRIE-resistant material (Fig. 1010.1).

“*Halahan* discloses removing said primary mask (Fig. 15, 1010.3) to expose said layer of DRIE-resistant material (Fig. 15, 1010.1) which has now been patterned to form a secondary mask (col.8, 62-64): etching by DRIE through said secondary mask (Fig. 15, 120) to cut said Si wafer (Fig. 22 and Fig. 5, or col. 4 15-25); and removing said secondary mask (Fig. 15, 120).....”

Applicant respectfully asserts that there are a number of errors and misconceptions in the previous statement. Figs. 10 and 15 both show a layer

structure of TiW **1010.1** and Cu **1010.2**, with Fig. 10 having an additional second layer of TiW **1010.3**. The TiW layer **1010.1** is described as a “barrier layer **1010.1**” (col. 7, line 37) with regard to Fig. 10 and as part of a “seed layer formed for electrodeposition of ED resist **1110**. In Fig. 15, the seed layer consists of
5 twosub-layers **1010.1**, and **1010.2**. The bottom layer is a .02um layer of TiW. The top layer **1010.2** is a 1 um layer of copper. The copper provides a low resistance to obtain a uniform electrical potential across the wafer during the ED resist deposition. The TiW layer improves copper adhesion.” (col.8, lines 49-57)

TiW is not regarded by those skilled in the art as a DRIE-resistant material.

10 There is a figure of merit used in the industry to compare how well a masking material withstands the milling process compared to the material it is intended to mask. This figure of merit is called “mask selectivity”, and the higher the number, the better the material is suited as a mask for a particular material. The present invention preferably uses a material such as Al_2O_3 as a DRIE mask, which has a
15 mask selectivity figure for SiO_2 of 3000. In comparison, TiW has a mask selectivity figure for SiO_2 estimated to be around 90. Thus, those skilled in the art would not understand TiW to be useful as a DRIE-resistant masking material. Additionally, the TiW layer **1010.1** is described as a barrier layer and as part of the seed layer to improve the adhesion of the copper layer.

20 Thus, the features of

“B) depositing a layer of DRIE-resistant material on said SiO_2 overcoat;

C) depositing a patterned layer of RIE-resistant material on said layer of DRIE-resistant material to form a primary mask;

25 D) etching by RIE through said primary mask to pattern said SiO_2 overcoat layer and said layer of DRIE-resistant material;

E) removing said primary mask to expose said layer of DRIE-resistant material which has now been patterned to form a secondary mask;

F) etching by DRIE through said secondary mask to cut said Si wafer into pieces; and
G) removing said secondary mask.”,

which are found in Claim 1 of the present application, are not found in the
5 *Halahan* reference nor in any combination of the cited prior art.

Therefore it cannot be fairly said that the present invention as claimed in
Claim 1 is obvious over *Halahan* in view of *Siniaguine*.

Likewise, neither reference, nor any combination of cited references,
includes the elements of the claimed invention as found in dependent claims 5-10,
10 which all inherit these assertedly novel features from Claim 1, and the
combination cannot be said to be obvious in view of them. Applicant therefore
respectfully requests that the rejections be withdrawn and Claims 1 and 5-10 be
allowed.

15 **Claim Rejections –35USC § 103:**

Examiner has stated that:

“Claims 2-4 are rejected under 35 U.S.C. 103(a) as being obvious over *Halahan* and
Siniaguine in view of *Matono* (US 6,477,019).

20 “...*Halahan* did not chose from the group consisting of Al₂O₃ for the *RIE-resistant*
material.” (emphasis added)

Applicant respectfully points out that Al₂O₃ is used as a **DRIE**-resistant
masking material. Again, the feature of forming a secondary mask of DRIE-
25 resistant material along with a primary mask of RIE-resistant material as claim in
Claim 1 is not found in any reference, nor any combination of cited references.
Claims 2-4 all inherit these assertedly novel features from Claim 1, and the

combination cannot be said to be obvious in view of them. Applicant therefore respectfully requests that the rejections be withdrawn and Claims 2-4 be allowed.

Claim Rejections –35USC § 103:

5 Examiner has stated that:

“Claims 11-20 are rejected under 35 U.S.C. 103(a) as being obvious over anticipated by *Halahan* and *Siniaguine* in view of *Matono* and *Mandal* et al. (USPN 6,171,945).

“...*Mandal* teaches....form a DRIE mask (Fig. 8F, 514)...”

10 The element **514** of Fig. 8 is referred to as a “hydrogenated silicon carbide etch stop **514**”. This material is not known as a DRIE-resistant material to those skilled in the art. In fact, Applicant can find no reference to DRIE processes in this cited patent at all.

Claim 11 states:

15 11. A method for fabricating recording head sliders made from silicon substrates, comprising:

- A) producing a SiO₂ overcoat on said Si wafer;
- B) depositing a layer of DRIE-resistant material on said SiO₂ overcoat;
- C) depositing a RIE mask on said layer of DRIE-resistant material;
- 20 D) etching by RIE through said RIE mask to pattern said SiO₂ overcoat layer and form a DRIE mask from said DRIE-resistant material;
- E) removing said RIE mask to expose said DRIE mask;
- F) etching by DRIE through said DRIE mask to cut said Si wafer; and
- G) removing said DRIE mask.

25

These features are not found in the *Halahan* reference nor in any combination of the cited prior art.

Therefore it cannot be fairly said that the present invention as claimed in Claim 11 is obvious over *Halahan* and *Siniaguine* in view of *Matono* and *Mandel*.

Likewise, neither reference, nor any combination of cited references, includes the elements of the claimed invention as found in dependent claims 12-20, which all inherit these assertedly novel features from Claim 11, and the combination cannot be said to be obvious in view of them. Applicant therefore respectfully requests that the rejections be withdrawn and Claims 11-20 be allowed.

Claim Rejections –35USC § 103:

Examiner has stated that:

“Claim 14 is rejected under 35 U.S.C. 103(a) as being obvious over *Halahan* and *Siniaguine* ...in view of *Matono* ... *Mandal* and *Sheplak* (USPN 6,018,861).

“...*Sheplak* et al. teaches a method of forming micro-sensor thin-film anemometer I which copper is used as a hard mask...”

As before, there is still no mention of a DRIE-mask in any of these references. Copper has been discussed instead as a material for an RIE mask. Therefore it cannot be fairly said that the present invention as claimed in Claim 11 is obvious over *Halahan* and *Siniaguine* in view of *Matono*, *Mandal* and *Sheplak*.

Thus no combination of cited references includes these assertedly novel features, and the combination cannot be said to be obvious in view of them. Applicant therefore respectfully requests that the rejections be withdrawn and Claim 14 be allowed.

Conclusion:

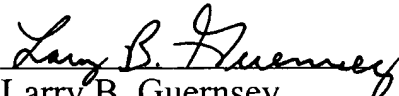
Applicant has endeavored to put this case into complete condition for allowance. It is thought that the §112 and §103 rejections have been corrected by amendment or were unfounded on the references cited. Applicant therefore respectfully asks that the rejections be withdrawn and that allowance of all claims presently in the case now be granted.

If the Examiner would like to discuss any of the points involved in the Response, she is urged to contact Applicant's Attorney at the numbers included below.

IPLO
1901 South Bascom Avenue, Suite 660
Campbell, CA 95008

Telephone: 408 558-7887
Facsimile: 408 558-9960
E-mail: lguernsey@iplo.com
LBG:lbg

Respectfully Submitted,


Larry B. Guernsey
Reg. No. 40,008